

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.-91. (Canceled)

92. (Currently Amended) A chip package comprising:

a substrate comprising a first pad having a surface with a first region, a second region and a third region between said first and second regions, and a solder mask layer on said first and second regions, wherein a first opening in said solder mask layer is over said third region, and said third region is at a bottom of said first opening;

a silicon chip over said substrate, wherein said silicon chip comprises a second pad having a surface with a fourth region, a fifth region and a sixth region between said fourth and fifth regions and over said third region, and a ~~passivation~~ separating layer on said fourth and fifth regions, wherein a second opening in said ~~passivation~~ separating layer is under said sixth region, and said sixth region is at a top of said second opening;

a copper pillar between said third region and said sixth region, wherein said copper pillar is connected to said third region through said first opening, and wherein said copper pillar is connected [[and]] to said sixth region through said second opening, wherein said second pad is connected to said first pad through said copper pillar;

a metal layer between said copper pillar and said sixth region, between said copper pillar and said ~~separating~~ passivation layer, between said copper pillar and said fourth region, and between said copper pillar and said fifth region, wherein said copper pillar is connected to said sixth region through said metal layer; and

a tin-containing layer between said copper pillar and said third region, wherein said copper pillar is connected to said third region through said tin-containing layer, wherein said tin-containing layer comprises silver, wherein said copper pillar has a thickness greater than a vertical distance between said copper pillar and said third region.

93.-96. (Canceled)

97. (Previously Presented) The chip package of claim 92, wherein said copper pillar is electroplated.

98. (Canceled)

99. (Previously Presented) The chip package of claim 92, wherein said tin-containing layer further comprises copper.

100. (Canceled)

101. (Previously Presented) The chip package of claim 92 further comprising a conductive layer between said copper pillar and said tin-containing layer, wherein said thickness of said copper pillar is greater than a thickness of said conductive layer.

102.-103. (Canceled)

104. (Previously Presented) The chip package of claim 92, wherein said tin-containing layer has a melting point less than that of said copper pillar.

105. (Canceled)

106. (Previously Presented) The chip package of claim 92, wherein said metal layer comprises titanium.

107. (Previously Presented) The chip package of claim 92, wherein said metal layer comprises a titanium-tungsten alloy.

108. (Previously Presented) The chip package of claim 92, wherein said metal layer comprises chromium.

109. (Previously Presented) The chip package of claim 92, wherein said metal layer comprises copper.

110.-117. (Canceled)

118. (Previously Presented) The chip package of claim 92, wherein said tin-containing layer contacts said copper pillar.

119. (Canceled)

120. (Currently Amended) A bonding structure on a chip comprising a pad having a top surface with a first region, a second region and a third region between said first and second regions, and a ~~passivation~~separating layer on said first and second regions, wherein an opening in said ~~passivation~~separating layer is over said third region, and said third region is at a bottom of said opening, comprising:

a metal layer on said third region, over said ~~passivation~~separating layer and over said first and second regions, wherein said metal layer is connected to said third region through said opening;

a copper pillar on said metal layer, over said separating~~passivation~~-layer and over said first, second and third regions, wherein said copper pillar is connected to said third region through said metal layer; and

a tin-containing cap over said copper pillar, wherein said tin-containing cap is connected to said copper pillar, wherein said tin-containing cap comprises silver, wherein said tin-containing cap has a first thickness less than a second thickness of said copper pillar.

121. (Previously Presented) The bonding structure of claim 120, wherein said tin-containing cap contacts said copper pillar.

122. (Currently Amended) The bonding structure of claim 120, wherein said tin-containing cap has a width~~greatest transverse dimension that is~~ less than that of said copper pillar.

123. (Previously Presented) The bonding structure of claim 120, wherein said metal layer comprises titanium.

124. (Canceled)

125. (Previously Presented) The bonding structure of claim 120, wherein said metal layer comprises chromium.

126. (Previously Presented) The bonding structure of claim 120 further comprising a conductive layer between said copper pillar and said tin-containing cap, wherein said second thickness is greater than a third thickness of said conductive layer.

127. (Previously Presented) The bonding structure of claim 120, wherein said metal layer comprises a titanium-tungsten alloy.

128. (Previously Presented) The bonding structure of claim 120, wherein said metal layer comprises copper.

129. (Previously Presented) The bonding structure of claim 120, wherein said tin-containing cap has a melting point less than that of said copper pillar.

130.-150. (Canceled)

151. (Currently Amended) A bonding structure on a chip comprising a pad having a top surface with a first region, a second region and a third region between said first and second regions, and a ~~passivation~~separating layer on said first and second regions, wherein an opening in said ~~separating~~passivation layer is over said third region, and said third region is at a bottom of said opening, comprising:

a metal layer on said third region, over said ~~separating~~passivation layer and over said first and second regions, wherein said metal layer is connected to said third region through said opening;

a copper pillar on said metal layer, over said ~~separating~~passivation layer and over said first, second and third regions, wherein said copper pillar is connected to said third region through said metal layer; and

a tin-containing cap over said copper pillar, wherein said tin-containing cap is connected to said copper pillar, wherein said tin-containing cap has a first thickness less than a second thickness of said copper pillar, wherein said tin-containing cap has a ~~greatest transverse dimension~~width less than that of said copper pillar.

152. (Previously Presented) The bonding structure of claim 151, wherein said tin-containing cap contacts said copper pillar.

153. (Canceled)

154. (Previously Presented) The bonding structure of claim 151, wherein said metal layer comprises titanium.

155. (Canceled)

156. (Previously Presented) The bonding structure of claim 151, wherein said metal layer comprises chromium.

157. (Previously Presented) The bonding structure of claim 151, wherein said metal layer comprises copper.

158. (Previously Presented) The bonding structure of claim 151, wherein said tin-containing cap comprises silver and copper.

159. (Previously Presented) The bonding structure of claim 151 further comprising a conductive layer between said copper pillar and said tin-containing cap, wherein said second thickness is greater than a third thickness of said conductive layer.

160. (Previously Presented) The bonding structure of claim 151, wherein said metal layer comprises a titanium-tungsten alloy.

161. (Previously Presented) The bonding structure of claim 151, wherein said tin-containing cap comprises silver.

162. (Previously Presented) The bonding structure of claim 151, wherein said tin-containing cap has a melting point less than that of said copper pillar.

163. (Previously Presented) The bonding structure of claim 120, wherein said copper pillar is electroplated.

164. (Previously Presented) The bonding structure of claim 151, wherein said copper pillar is electroplated.

165. (Previously Presented) The bonding structure of claim 120, wherein said tin-containing cap further comprises copper.

166. (New) A chip package comprising:

- a substrate comprising a solder mask layer and a first bonding pad at a top side of said substrate, wherein a first opening in said solder mask is over a first contact point of said first bonding pad, and said first contact point is at a bottom of said first opening;

- a chip over said substrate, wherein said chip comprises a separating layer and a second bonding pad at a bottom side of said chip, wherein a second opening in said separating layer is under a second contact point of said second bonding pad, and said second contact point is at a top of said first opening;

- a copper pillar between said first and second contact points, wherein said copper pillar has a width greater than that of said first opening, wherein said copper pillar has a thickness greater than a depth of said first opening;

- a tin-containing layer between said copper pillar and said first contact point; and
- an underfill between said chip and said substrate.

167. (New) The chip package of claim 166 further comprising a titanium-containing layer between said copper pillar and said second contact point.

168. (New) The chip package of claim 166, wherein said tin-containing layer comprises silver.

169. (New) A chip package comprising:

- a substrate comprising a solder mask layer and a first bonding pad at a top side of said substrate, wherein a first opening in said solder mask is over a first contact point of said first bonding pad, and said first contact point is at a bottom of said first opening;

- a chip over said substrate, wherein said chip comprises a separating layer and a second bonding pad at a bottom side of said chip, wherein a second opening in said separating layer is

under a second contact point of said second bonding pad, and said second contact point is at a top of said first opening;

a copper pillar between said first and second contact points, wherein said copper pillar has a width greater than that of said first opening;

a tin-containing layer between said copper pillar and said first contact point, wherein said copper pillar has a thickness greater than a vertical distance between said copper pillar and said solder mask layer; and

an underfill between said chip and said substrate.

170. (New) The chip package of claim 169 further comprising a titanium-containing layer between said copper pillar and said second contact point.

171. (New) The chip package of claim 169, wherein said tin-containing layer comprises silver.

172. (New) The chip package of claim 169, wherein said vertical distance is between a bottom surface of said copper pillar and a top surface of said solder mask layer.